

Claims

- [c1] A simulation system for simulating an operation of an automotive vehicle comprising:
an input providing vehicle information and path information;
a controller having a vehicle computer model therein, said controller programmed to determine a rear side slip angle of a vehicle computer model;
when the rear side slip angle is greater than a threshold, determine a look ahead scale factor;
when the rear side slip angle is greater than the threshold, increase a look ahead point as a function of the look ahead scale factor;
determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path;
operate the computer model with the steering wheel angle input; and
generate an output in response to the vehicle model and the initial steering wheel input or the first steering wheel input.
- [c2] A system as recited in claim 1 wherein the threshold is

about 15 degrees.

- [c3] A method as recited in claim 1 wherein said controller is programmed to determine a longitudinal vehicle velocity and a lateral vehicle velocity and determining the rear side slip angle as a function of the longitudinal vehicle velocity and the lateral vehicle velocity.
- [c4] A system as recited in claim 1 wherein said controller is programmed to determine a look ahead scale factor as a function of the rear side slip angle.
- [c5] A system as recited in claim 1 wherein said controller is programmed to determine a look ahead factor as a function of an exponential of the rear side slip angle.
- [c6] A system as recited in claim 1 wherein said controller is programmed to determine a look ahead factor as a function of an exponential of a product of the rear side slip angle and a constant.
- [c7] A system as recited in claim 6 wherein the constant is about .02.
- [c8] A system as recited in claim 1 wherein when the rear side slip angle is not greater than the threshold, determining an unscaled look ahead factor.
- [c9] A system as recited in claim 1 wherein the controller is

programmed to determine a steering wheel angle input when the vehicle is not on target.

- [c10] A method of operating a vehicle computer model having vehicle information and path information therein comprising:
 - determining a rear side slip angle of a vehicle computer model;
 - when the rear side slip angle is greater than a threshold, determining a look ahead scale factor;
 - when the rear side slip angle is greater than the threshold, increasing a look ahead point as a function of the look ahead scale factor;
 - determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path; and
 - operating the computer model with the steering wheel angle input.
- [c11] A method as recited in claim 10 wherein the threshold is about 15 degrees.
- [c12] A method as recited in claim 10 wherein determining a rear side slip angle comprises determining a longitudinal vehicle velocity and a lateral vehicle velocity and determining the side slip angle as a function of the longitudinal vehicle velocity and the lateral vehicle velocity.

- [c13] A method as recited in claim 10 wherein determining a look ahead scale factor comprises determining a look ahead factor as a function of the rear side slip angle.
- [c14] A method as recited in claim 10 wherein determining a look ahead scale factor comprises determining a look ahead factor as a function of an exponential of the rear side slip angle.
- [c15] A method as recited in claim 10 wherein determining a look ahead scale factor comprises determining a look ahead factor as a function of an exponential of a product of the rear side slip angle and a constant.
- [c16] A method as recited in claim 15 wherein the constant is about .02.
- [c17] A method as recited in claim 10 wherein when the rear side slip angle is not greater than the threshold, determining an unscaled look ahead factor.
- [c18] A method as recited in claim 10 further comprising performing the step of determining a steering wheel angle input when the vehicle is not on target.
- [c19] A method of operating a vehicle computer model having vehicle information and path information therein comprising:

determining a rear side slip angle of a vehicle computer model;

determining a look ahead point;

when the rear side slip angle is greater than a threshold, determining a look ahead scale factor;

when the rear side slip angle is greater than the threshold, increasing the look ahead point as a function of the look ahead scale factor;

when the rear side slip angle is less than the threshold, maintaining the look ahead point;

when the vehicle model is off target, determining a steering wheel angle input to the computer model as a function of an error between the look ahead point and the intended path; and

operating the computer model with the steering wheel angle input.

- [c20] A method as recited in claim 19 wherein determining a look ahead scale factor comprises determining a look ahead factor as a function of an exponential of the rear side slip angle.